OBSERVATIONS & RECOMMENDATIONS

After reviewing data collected from **Winnisquam Lake, Laconia,** the program coordinators have made the following observations and recommendations.

We congratulate your group on sampling the Three Island station **once** this year, the Mohawk Island station **twice** this year, and the **Pot Island** station **three** times this year! However, we encourage your group to conduct more sampling events in the future. Typically, we recommend that monitoring groups sample three times per summer (once in **June**, **July**, and **August**). We understand that the number of sampling events you decide to conduct per summer will depend upon volunteer availability, and your group's goals and funding availability. However, with a limited amount of data it is difficult to determine accurate and representative water quality trends. Since weather patterns and activity in the watershed can change throughout the summer, from year to year, and even from hour to hour during a rain event, it is a good idea to sample the lake at least once per month during the summer.

If you are having difficulty finding volunteers to help sample or to travel to one of the laboratories, please call the VLAP Coordinator and DES will help you work out an arrangement.

As part of the Environmental Protection Agency's (EPA) National Lake Assessment (NLA) initiative, DES biologists performed a comprehensive lake assessment on **Winnisquam Lake** in **July** during **2007**. The NLA serves to assess the Nation's lake and determine the percentage of our Nation's lakes that are in good, fair or poor condition. Lakes were randomly selected based on a statistical survey representing the population of lakes in their ecological region, but had to be at least one meter deep and over ten acres in size. Lakes were assessed using standard protocols, and the following parameters were measured: temperature, dissolved oxygen, nutrients, chlorophyll-a, water clarity, turbidity, color, zooplankton and phytoplankton, bacteria, macroinvertebrates, habitat condition, and sediment cores. Some data from this assessment has been included in your annual report and added to the historical database for your lake. The lake's data will help to determine the regional and national condition of lakes. Those volunteer monitoring groups with historical data can compare the condition of their lakes on a statewide, regional or national level. Data from the National Lake Assessment will be compiled, entered into a national database, analyzed, and a draft report will be made available for public review. For more information about EPA's NLA please visit www.epa.gov/owow/lakes/lakessurvey.

We encourage your monitoring group to formally participate in the DES Weed Watchers program, a volunteer program dedicated to monitoring lakes and ponds for the presence of exotic aquatic plants. This program only involves a small amount of time during the summer months. Volunteers survey their waterbody once a month from **May** through **September**. To survey, volunteers slowly boat, or even snorkel, around the perimeter of the waterbody and any islands it may contain. Using the materials provided in the Weed Watcher kit, volunteers look for any species that are suspicious. After a trip or two around the waterbody, volunteers will have a good knowledge of its plant community and will immediately notice even the most subtle changes. If a suspicious plant is found, the volunteers immediately send a specimen to DES for identification. If the plant specimen is an exotic species, a biologist will visit the site to determine the extent of the problem and to formulate a management plan to control the nuisance infestation. Remember that early detection is the key to controlling the spread of exotic plants.

If you would like to help protect your lake or pond from exotic plant infestations, contact Amy Smagula, Exotic Species Program Coordinator, at 271-2248 or visit the Weed Watchers website at www.des.state.nh.us/wmb/exoticspecies/survey.htm.

FIGURE INTERPRETATION

- **Figure 1 and Table 1:** Figure 1 in Appendix A shows the historical and current year chlorophyll-a concentration in the water column. Table 1 in Appendix B lists the maximum, minimum, and mean concentration for each sampling year that the lake has been monitored through VLAP.

  Chlorophyll-a, a pigment found in plants, is an indicator of the algal abundance. Algae are typically microscopic plants that are naturally occurring in lake ecosystems and contain chlorophyll-a. The chlorophyll-a concentration measured in the water gives biologists an estimation of the algal concentration or lake productivity. **The median summer chlorophyll-a concentration for New Hampshire's lakes and ponds is 4.58 mg/m^3.**

  Three Island Station
  The current year data (the top graph) show that the chlorophyll-a concentration was **4.40 mg/m^3** in **August**.

The historical data (the bottom graph) show that the **2007** chlorophyll-a mean is ***slightly less than*** the state median and is ***much greater than*** the similar lake median. For more information on the similar lake median, refer to Appendix F.

Overall, the statistical analysis of the historical data (the bottom graph) shows that the mean annual chlorophyll-a concentration has ***not significantly changed*** since monitoring began. Specifically, the mean annual chlorophyll-a concentration has ***fluctuated between approximately 1.83 and 4.4 mg/m³,*** but has ***not continually increased or decreased*** since **1987**. Please refer to Appendix E for a detailed statistical analysis explanation and data print-out.

Mohawk Island Station
The current year data (the top graph) show that the chlorophyll-a concentration ***increased slightly*** from **July** to **August**.

The historical data (the bottom graph) show that the **2007** chlorophyll-a mean is ***much less than*** the state median and is ***slightly greater than*** the similar lake median. For more information on the similar lake median, refer to Appendix F.

Overall, the statistical analysis of the historical data (the bottom graph) shows that the mean annual chlorophyll-a concentration has ***not significantly changed*** since monitoring began. Specifically, the mean annual chlorophyll-a concentration has ***fluctuated between approximately 1.66 and 7.01 mg/m³,*** but has ***not continually increased or decreased*** since **1987**. Please refer to Appendix E for a detailed statistical analysis explanation and data print-out.

Pot Island Station
The current year data (the top graph) show that the chlorophyll-a concentration ***decreased continually*** from **July** through **September**.

The historical data (the bottom graph) show that the **2007** chlorophyll-a mean is ***less than*** the state median and is ***approximately equal to*** the similar lake median. For more information on the similar lake median, refer to Appendix F.

Overall, the statistical analysis of the historical data (the bottom graph) shows that the mean annual chlorophyll-a concentration has ***not significantly changed*** since monitoring began. Specifically, the mean annual chlorophyll-a concentration has ***fluctuated between approximately 1.15 and 3.35 mg/m³,*** but has ***not continually increased or decreased*** since **1987**. Please refer to Appendix E for a detailed statistical analysis explanation and data print-out.

While algae are naturally present in all lakes, an excessive or increasing amount of any type is not welcomed. In freshwater lakes, phosphorus is the nutrient that algae typically depend upon for growth in New Hampshire lakes. Algal concentrations may increase as nonpoint sources of phosphorus from the watershed increase, or as in-lake phosphorus sources increase. Therefore, it is extremely important for volunteer monitors to continually educate all watershed residents about management practices that can be implemented to minimize phosphorus loading to surface waters.

- **Figure 2 and Tables 3a and 3b:** Figure 2 in Appendix A shows the historical and current year data for transparency with and without the use of a viewscope. Table 3a in Appendix B lists the maximum, minimum and mean transparency data without the use of a viewscope and Table 3b lists the maximum, minimum and mean transparency data with the use of a viewscope for each year that the lake has been monitored through VLAP.

  Volunteer monitors use the Secchi disk, a 20 cm disk with alternating black and white quadrants, to measure how far a person can see into the water. Transparency, a measure of water clarity, can be affected by the amount of algae and sediment in the water, as well as the natural color of the water. **The median summer transparency for New Hampshire's lakes and ponds is 3.2 meters.**

  Three Island Station
  The current year data (the top graph) show that the non-viewscope in-lake transparency was **6.0 meters** in **August**.

  The historical data (the bottom graph) show that the **2007** mean non-viewscope transparency is ***greater than*** the state median and is ***less than*** the similar lake median. Please refer to Appendix F for more information about the similar lake median.

  The current year data (the top graph) show that the viewscope in-lake transparency was ***greater than*** the non-viewscope transparency on the **August** sampling event. As discussed previously, a comparison of transparency readings taken with and without the use of a viewscope shows that the viewscope typically increases the depth to which the Secchi disk can be seen into the lake, particularly on sunny and windy days. We recommend that your group measure Secchi disk transparency with and without the viewscope on each sampling event.

  It is important to note that viewscope transparency data are not compared to a New Hampshire median or similar lake median. This is because lake transparency with the use of a viewscope has not been historically measured by DES. At some point in the future, the

New Hampshire and similar lake medians for viewscope transparency will be calculated and added to the appropriate graphs.

Overall, the statistical analysis of the historical data (the bottom graph) shows that the mean annual non-viewscope transparency has ***not significantly changed*** since monitoring began. Specifically, the transparency has ***fluctuated between approximately 4.75 and 10.5 meters,*** but has ***not continually increased or decreased*** since **1987**. Please refer to Appendix E for the detailed statistical analysis explanation and data print-out.

Mohawk Island Station
The current year data (the top graph) show that the non-viewscope in-lake transparency ***increased*** from **July** to **August**.

The historical data (the bottom graph) show that the **2007** mean non-viewscope transparency is ***greater than*** the state median and is ***less than*** the similar lake median. Please refer to Appendix F for more information about the similar lake median.

The current year data (the top graph) show that the viewscope in-lake transparency was ***greater than*** the non-viewscope transparency on the **August** sampling event. The transparency was ***not*** measured with the viewscope on the **July** sampling events. As discussed previously, a comparison of transparency readings taken with and without the use of a viewscope shows that the viewscope typically increases the depth to which the Secchi disk can be seen into the lake, particularly on sunny and windy days. We recommend that your group measure Secchi disk transparency with and without the viewscope on each sampling event.

Overall, the statistical analysis of the historical data (the bottom graph) shows that the mean annual in-lake non-viewscope transparency has ***not significantly changed*** (either *increased* or *decreased*) since monitoring began. Specifically, the in-lake transparency has remained ***relatively stable, ranging between approximately 5.1 and 7.9 meters*** since **1987**. Please refer to Appendix E for the statistical analysis explanation and data print-out.

Pot Island Station
The current year data (the top graph) show that the non-viewscope in-lake transparency ***decreased*** from **July** to **August**, and then ***increased*** from **August** to **September**.

The historical data (the bottom graph) show that the **2007** mean non-viewscope transparency is ***much greater than*** the state median and is ***slightly less than*** the similar lake median. Please refer to Appendix F for more information about the similar lake median.

The current year data (the top graph) show that the viewscope in-lake transparency ***remained stable*** from **July** through **September**. Again, the transparency measured with the viewscope was generally ***greater than*** the transparency measured without the viewscope this summer.

Overall, the statistical analysis of the historical data (the bottom graph) shows that the mean annual in-lake non-viewscope transparency has ***not significantly changed*** (either *increased* or *decreased*) since monitoring began. Specifically, the in-lake transparency has remained ***relatively stable, ranging between approximately 7.25 and 9.08 meters*** since **1987**. Please refer to Appendix E for the statistical analysis explanation and data print-out.

Typically, high intensity rainfall causes sediment-laden stormwater runoff to flow into surface waters, thus increasing turbidity and decreasing clarity. To maintain high levels of transparency in the lake, efforts should continually be made to stabilize stream banks, lake shorelines, disturbed soils within the watershed, and especially dirt roads located immediately adjacent to the edge of tributaries and the lake. Guides to best management practices that can be implemented to reduce, and possibly even eliminate, nonpoint source pollutants, are available from DES upon request.

- **Figure 3 and Table 8:** The graphs in Figure 3 in Appendix A show the amount of epilimnetic (upper layer) phosphorus and hypolimnetic (lower layer) phosphorus; the inset graphs show current year data. Table 8 in Appendix B lists the annual maximum, minimum, and median concentration for each deep spot layer and each tributary since the lake has been sampled through VLAP.

  Phosphorus is typically the limiting nutrient for vascular plant and algae growth in New Hampshire's lakes and ponds. Excessive phosphorus in a lake/pond can lead to increased plant and algal growth over time. **The median summer total phosphorus concentration in the epilimnion (upper layer) of New Hampshire's lakes and ponds is 12 ug/L. The median summer phosphorus concentration in the hypolimnion (lower layer) is 14 ug/L.**

  Three Island Station
  The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration was **5.9 ug/L** in **August**.

  The historical data show that the **2007** mean epilimnetic phosphorus concentration is ***much less than*** the state median and is ***slightly***

greater than the similar lake median. Refer to Appendix F for more information about the similar lake median.

The current year data for the hypolimnion (the bottom inset graph) show that the phosphorus concentration was **14.0 ug/L** in **August**.

The historical data show that the **2007** mean hypolimnetic phosphorus concentration is ***approximately equal to*** the state median and is ***much greater than*** the similar lake median. Please refer to Appendix F for more information about the similar lake median.

Overall, the statistical analysis of the historical data shows that the phosphorus concentration in the epilimnion (upper layer) has ***not significantly changed*** since monitoring began. Specifically, the epilimnetic phosphorus concentration has ***fluctuated between approximately 5.0 and 13.0 ug/L,*** but has ***not continually increased or decreased*** since **1987**. Please refer to Appendix E for the detailed statistical analysis explanation and data print-out.

Overall, the statistical analysis of the historical data shows that the phosphorus concentration in the hypolimnion (lower layer) has ***significantly decreased*** (meaning ***improved***) on average by ***approximately 5.542 percent*** per year during the sampling period **1987** to **2007**. Please refer to Appendix E for the statistical analysis explanation and data print-out. We hope this improving trend continues!

Mohawk Island Station
The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***increased*** from **July** to **August**.

The historical data show that the **2007** mean epilimnetic phosphorus concentration is ***much less than*** the state median and is ***slightly greater than*** the similar lake median. Refer to Appendix F for more information about the similar lake median.

The current year data for the hypolimnion (the bottom inset graph) show that the phosphorus concentration ***increased*** from **July** to **August**.

The historical data show that the **2007** mean hypolimnetic phosphorus concentration is ***greater than*** the state median and the similar lake median. Please refer to Appendix F for more information about the similar lake median.

Overall, the statistical analysis of the historical data shows that the phosphorus concentration in the epilimnion (upper layer) and the hypolimnion (lower layer) has ***not significantly changed*** since monitoring began. Specifically, the epilimnetic phosphorus concentration has ***fluctuated between approximately 5.0 and 12.5 ug/L,*** and the hypolimnetic phosphorus concentration has ***fluctuated between approximately 9.0 and 83.0 ug/L*** since **1987**. Please refer to Appendix E for the detailed statistical analysis explanation and data print-out.

Pot Island Station

The current year data for the epilimnion (the top inset graph) show that the phosphorus concentration ***increased*** from **July** to **August**, and then ***decreased*** from **August** to **September**.

The historical data show that the **2007** mean epilimnetic phosphorus concentration is ***much less than*** the state median and is ***approximately equal to*** the similar lake median. Refer to Appendix F for more information about the similar lake median.

The current year data for the hypolimnion (the bottom inset graph) show that the phosphorus concentration ***decreased*** from **July** to **August**, and then ***remained stable*** from **August** to **September**.

The historical data show that the **2007** mean hypolimnetic phosphorus concentration is ***much less than*** the state median and is ***slightly greater than*** the similar lake median. Please refer to Appendix F for more information about the similar lake median.

Overall, the statistical analysis of the historical data shows that the phosphorus concentration in the epilimnion (upper layer) has ***significantly decreased*** (meaning ***improved***) on average by ***approximately 1.702 percent*** per sampling year during the sampling period **1987** to **2007**. Please refer to Appendix E for the statistical analysis explanation and data print-out. We hope this improving trend continues!

Overall, the statistical analysis of the historical data shows that the phosphorus concentration in the hypolimnion (lower layer) has ***not significantly changed*** since monitoring began. Specifically, the hypolimnetic phosphorus concentration has ***fluctuated between approximately 5.0 and 15.5 ug/L*** but has ***not continually increased or decreased*** since **1987**.

One of the most important approaches to reducing phosphorus loading to a waterbody is to continually educate watershed residents about the watershed sources of phosphorus and how excessive phosphorus loading can negatively affect the ecology and the recreational, economical, and ecological value of lakes and ponds.

TABLE INTERPRETATION

- **Table 2: Phytoplankton**

  Table 2 in Appendix B lists the current and historical phytoplankton and/or cyanobacteria observed in the lake. Specifically, this table lists the three most dominant phytoplankton and/or cyanobacteria observed in the sample and their relative abundance in the sample.

  Three Island Station
  The dominant phytoplankton and/or cyanobacteria observed in the **August** sample were ***Chrysosphaerella*** **(Golden-Browns),** ***Asterionella*** **(Diatoms),** and ***Tabellaria*** **(Diatoms)**.

  Mohawk Island Station
  The dominant phytoplankton and/or cyanobacteria observed in the **August** sample were ***Chrysosphaerella*** **(golden-Browns),** ***Asterionella*** **(Diatoms),** and ***Rhizosolenia*** **(Diatoms)**.

  Phytoplankton populations undergo a natural succession during the growing season. Please refer to the "Biological Monitoring Parameters" section of this report for a more detailed explanation regarding seasonal plankton succession. Diatoms and golden-brown algae populations are typical in New Hampshire's less productive lakes and ponds.

- **Table 4: pH**

  Table 4 in Appendix B presents the in-lake and tributary current year and historical pH data.

  pH is measured on a logarithmic scale of 0 (acidic) to 14 (basic). pH is important to the survival and reproduction of fish and other aquatic life. A pH below 6.0 typically limits the growth and reproduction of fish. A pH between 6.0 and 7.0 is ideal for fish. The median pH value for the epilimnion (upper layer) in New Hampshire's lakes and ponds is **6.6**, which indicates that the state surface waters are slightly acidic. For a more detailed explanation regarding pH, please refer to the "Chemical Monitoring Parameters" section of this report.

  Three Island Station
  The mean pH at the deep spot this year ranged from **6.34** in the hypolimnion to **6.92** in the epilimnion, which means that the water is ***slightly acidic***.

Mohawk Island Station
The mean pH at the deep spot this year ranged from **6.21** in the hypolimnion to **6.67** in the epilimnion, which means that the water is ***slightly acidic***.

Pot Island Station
The mean pH at the deep spot this year ranged from **6.45** in the hypolimnion to **6.77** in the epilimnion, which means that the water is ***slightly acidic***.

It is important to point out that the hypolimnetic (lower layer) pH was ***lower (more acidic)*** than in the epilimnion (upper layer). This increase in acidity near the lake bottom is likely due to the decomposition of organic matter and the release of acidic by-products into the water column.

Due to the state's abundance of granite bedrock in the state and acid deposition received from snowmelt, rainfall, and atmospheric particulates, there is little that can be feasibly done to effectively increase lake pH.

- **Table 5: Acid Neutralizing Capacity**

Table 5 in Appendix B presents the current year and historical epilimnetic ANC for each year the lake has been monitored through VLAP.

Buffering capacity (ANC) describes the ability of a solution to resist changes in pH by neutralizing the acidic input. The median ANC value for New Hampshire's lakes and ponds is **4.8 mg/L**, which indicates that many lakes and ponds in the state are at least "moderately vulnerable" to acidic inputs. For a more detailed explanation about ANC, please refer to the "Chemical Monitoring Parameters" section of this report.

The mean acid neutralizing capacity (ANC) of the epilimnion (upper layer) was **7.4 mg/L** at **Three Island Station**, **7.4 mg/L** at **Mohawk Island Station,** and **5.7 at Pot Island Station** which are all ***greater than*** the state median. In addition, this indicates that the lake is ***moderately vulnerable*** to acidic inputs.

- **Table 6: Conductivity**

Table 6 in Appendix B presents the current and historical conductivity values for tributaries and in-lake data. Conductivity is the numerical expression of the ability of water to carry an electric current, which is determined by the number of negatively charged ions from metals, salts, and minerals in the water column. The median conductivity value for New Hampshire's lakes and ponds is **38.4 uMhos/cm**. For a more detailed explanation, please refer to the "Chemical Monitoring Parameters" section of this report.

The mean annual epilimnetic conductivity at the deep spot this year was **77.87 uMhos/cm at Three Island**, **77.22 uMhos/cm at Mohawk Island**, and **77.72 at Pot Island** which are all ***greater than*** the state median.

The **2007** conductivity results for the deep spot and tributaries were ***lower than*** has been measured **during the past few years**. It is likely that the lack of rainfall during the **2007** season reduced watershed runoff to the lake. Typically, rain events and snowmelt cause potentially pollutant laden watershed runoff to reach tributaries and ultimately the lake leading to elevated conductivity levels.

- **Table 7a and Table 7b: Total Kjeldahl Nitrogen and Nitrite+Nitrate Nitrogen**

Table 7a in Appendix B presents the current year and historical Total Kjeldahl Nitrogen and Table 7b presents the current year and historical nitrite and nitrate nitrogen. Nitrogen is another nutrient that is essential for the growth of plants and algae. Nitrogen is typically the limiting nutrient in estuaries and coastal ecosystems. However, in freshwater, nitrogen is not typically the limiting nutrient. Therefore, nitrogen is not typically sampled through VLAP. However, if phosphorus concentrations in freshwater are elevated, then nitrogen loading may stimulate additional plant and algal growth. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

During the most recent DES Lake Assessment Program survey, which was conducted during Summer **2007**, the ratio of the total nitrogen concentration to total phosphorus (TN:TP) concentration in the epilimnion sample was **approximately 42,** which is ***greater than*** **15**, indicating that the lake is **phosphorus-limited**. This means that any additional **phosphorus** loading to the pond will stimulate additional plant and algal growth. Therefore, it is not critical to conduct nitrogen sampling.

- **Table 8: Total Phosphorus**

Table 8 in Appendix B presents the current year and historical total phosphorus data for in-lake and tributary stations. Phosphorus is the nutrient that limits the algae's ability to grow and reproduce. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

The phosphorus concentration in the **tributaries** was ***relatively low*** this year, which is good news. However, we recommend that your monitoring group sample the major tributaries to the lake during snow-melt and periodically during rainstorms to determine if the phosphorus concentration is ***elevated*** in the tributaries during these times. Typically, the majority of nutrient loading to a lake occurs in the spring during snow-melt and during intense rainstorms that cause soil erosion and surface runoff and within the watershed.

For a detailed explanation on how to conduct rain event sampling and stream surveys, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at http://www.des.nh.gov/wmb/vlap/2002/documents/Appndxd_monitoring.pdf, or contact the VLAP Coordinator.

- **Table 9 and Table 10: Dissolved Oxygen and Temperature Data**
  Table 9 in Appendix B shows the dissolved oxygen/temperature profile(s) collected during **2007**. Table 10 in Appendix B shows the historical and current year dissolved oxygen concentration in the hypolimnion (lower layer). The presence of sufficient amounts of dissolved oxygen in the water column is vital to fish and amphibians and bottom-dwelling organisms. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

  The dissolved oxygen concentration was ***high*** at the **Three Island and Pot Island Stations** deep spot depths sampled at the lake on the **August** sampling event. As thermally stratified lakes age, and as the summer progresses, oxygen typically becomes ***depleted*** in the hypolimnion (lower layer) by the process of decomposition. Specifically, the loss of oxygen in the hypolimnion results primarily from biological organisms using oxygen to break down organic matter, both in the water column and particularly at the bottom of the lake where the water meets the sediment. The ***high*** oxygen level in the hypolimnion is a sign of the lake's overall good health. We hope this continues!

  The dissolved oxygen concentration was ***much lower in the hypolimnion (lower layer) than in the epilimnion (upper layer)*** at the **Mohawk Island** deep spot on the **August** sampling event. As stratified lakes age, and as the summer progresses, oxygen typically becomes ***depleted*** in the hypolimnion by the process of decomposition. Specifically, the reduction of hypolimnetic oxygen is primarily a result of biological organisms using oxygen to break down organic matter, both in the water column and particularly at the bottom of the lake where the water meets the sediment. When hypolimnetic oxygen concentration is depleted to less than 1 mg/L, **as it was on the annual biologist visit this year and on many previous annual visits,** the phosphorus that is normally bound up in the sediment may be re-released into the water column, a process referred to as ***internal phosphorus loading***.

Low hypolimnetic oxygen levels are a sign of the lake's ***aging*** and ***declining*** health. This year the DES biologist collected the dissolved oxygen profile in **August.** We recommend that the annual biologist visit for the **2008** sampling year be scheduled during **June** so that we can determine if oxygen is depleted in the hypolimnion ***earlier*** in the sampling year.

- **Table 11: Turbidity**
  Table 11 in Appendix B lists the current year and historical data for in-lake and tributary turbidity. Turbidity in the water is caused by suspended matter, such as clay, silt, and algae. Water clarity is strongly influenced by turbidity. Please refer to the "Other Monitoring Parameters" section of this report for a more detailed explanation.

  The tributary and deep spot turbidity was ***relatively low*** this year, which is good news.

  However, we recommend that your group sample the pond and any surface water runoff areas during significant rain events to determine if stormwater runoff contributes turbidity and phosphorus to the pond.

  For a detailed explanation on how to conduct rain event sampling, please refer to the 2002 VLAP Annual Report special topic article, which is posted on the VLAP website at http://www.des.nh.gov/wmb/vlap/2002/documents/Appndxd_monitoring.pdf, or contact the VLAP Coordinator.

- **Table 12: Bacteria (*E.coli*)**
  Table 12 in Appendix B lists the current year and historical data for bacteria *(E.coli*) testing. *E. coli* is a normal bacterium found in the large intestine of humans and other warm-blooded animals. *E.coli* is used as an indicator organism because it is easily cultured and its presence in the water, in defined amounts, indicates that sewage **may** be present. If sewage is present in the water, potentially harmful disease-causing organisms **may** also be present.

  Two in-lake locations were sampled for *E.coli* on the **August** National Lake Assessment Program sampling event. The results were **5** and **<**

10, which are both ***much less than*** the state standard of 406 counts per 100 mL for recreational surface waters that are not designated public beaches and 88 counts per 100 mL for surface waters that are designated public beaches.

If residents are concerned about sources of bacteria, such as failing septic systems, animal waste, or waterfowl waste, it is best to conduct *E. coli* testing when the water table is high, when beach use is heavy, or immediately after rain events.

- **Table 13: Chloride**
  Table 13 in Appendix B lists the current year and the historical data for chloride sampling. The chloride ion (Cl^-) is found naturally in some surfacewaters and groundwaters and in high concentrations in seawater. Research has shown that elevated chloride levels can be toxic to freshwater aquatic life. In order to protect freshwater aquatic life in New Hampshire, the state has adopted **acute and chronic** chloride criteria of **860 and 230 mg/L** respectively. The chloride content in New Hampshire lakes is naturally low, generally less than 2 mg/L in surface waters located in remote areas away from habitation. Higher values are generally associated with salted highways and, to a lesser extent, with septic inputs. Please refer to the "Chemical Monitoring Parameters" section of this report for a more detailed explanation.

  The **epilimnion** was sampled for chloride during the **August** sampling event. The result was **15.0 mg/L**, which is ***much less than*** the state acute and chronic chloride criteria. However, this concentration is ***greater than*** the New Hampshire median of **5 mg/L**.

- **Table 14: Current Year Biological and Chemical Raw Data**
  Table 14 in Appendix B lists the most current sampling year results. Since the maximum, minimum, and annual mean values for each parameter are not shown on this table, this table displays the current year "raw," meaning unprocessed, data. The results are sorted by station, depth, and then parameter.

- **Table 15: Station Table**
  As of the spring of 2004, all historical and current year VLAP data are included in the DES Environmental Monitoring Database (EMD). To facilitate the transfer of VLAP data into the EMD, a new station identification system had to be developed. While volunteer monitoring groups can still use the sampling station names that they have used in the past and are most familiar with, an EMD station

name also exists for each VLAP sampling location. Table 15 in Appendix B identifies what EMD station name corresponds to the station names you have used in the past and will continue to use in the future.

DATA QUALITY ASSURANCE AND CONTROL

Annual Assessment Audit:

During the annual visit to your lake, the biologist conducted a sampling procedures assessment audit for your monitoring group. Specifically, the biologist observed the performance of your monitoring group and completed an assessment audit sheet to document the volunteer monitors' ability to follow the proper field sampling procedures, as outlined in the VLAP Monitor's Field Manual. This assessment is used to identify any aspects of sample collection in which volunteer monitors failed to follow proper procedures, and also provides an opportunity for the biologist to retrain the volunteer monitors as necessary. This will ultimately ensure samples that the volunteer monitors collect are truly representative of actual lake and tributary conditions.

Overall, your monitoring group did an ***excellent*** job collecting samples on the annual biologist visit this year! Specifically, the members of your monitoring group followed the proper field sampling procedures and there was no need for the biologist to provide additional training. Keep up the good work!

Sample Receipt Checklist:

Each time your monitoring group dropped off samples at the laboratory this summer, the laboratory staff completed a sample receipt checklist to assess and document if your group followed proper sampling techniques when collecting the samples. The purpose of the sample receipt checklist is to minimize, and hopefully eliminate, improper sampling techniques.

Overall, the sample receipt checklist showed that your monitoring group did an ***excellent*** job when collecting samples and submitting them to the laboratory this year! Specifically, the members of your monitoring group followed the proper field sampling procedures and there was no need for the laboratory staff to contact your group with questions, and no samples were rejected for analysis.

USEFUL RESOURCES

Acid Deposition Impacting New Hampshire's Ecosystems, DES fact sheet ARD-32, (603) 271-2975 or www.des.nh.gov/factsheets/ard/ard-32.htm.

Best Management Practices to Control Nonpoint Source Pollution: A Guide for Citizens and Town Officials, DES Booklet WD-03-42, (603) 271-2975.

Best Management Practices for Well Drilling Operations, DES fact sheet WD-WSEB-21-4, (603) 271-2975 or www.des.nh.gov/factsheets/ws/ws-21-4.htm.

Biodegradable Soaps and Water Quality, DES fact sheet BB-54, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-54.htm.

Canada Geese Facts and Management Options, DES fact sheet BB-53, (603) 271-2975 or www.des.nh.gov/factsheets/bb/bb-53.htm.

Cyanobacteria in New Hampshire Waters Potential Dangers of Blue-Green Algae Blooms, DES fact sheet WMB-10, (603) 271-2975 or www.des.nh.gov/factsheets/wmb/wmb-10.htm.

Erosion Control for Construction in the Protected Shoreland Buffer Zone, DES fact sheet WD-SP-1, (603) 271-2975 or www.des.nh.gov/factsheets/sp/sp-1.htm.

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